



# Credit Coin: A Privacy-Preserving Blockchain-Based Incentive Announcement Network for Communications of Smart Vehicles

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## How to Cite this Article:

RITHIKA, D., BHARATHI, B., SAIKIRAN, B. & HARSHAVARDHAN, K. (2026). Credit Coin: A Privacy-Preserving Blockchain-Based Incentive Announcement Network for Communications of Smart Vehicles. International Journal of Creative and Open Research in Engineering and Management, <i>02</i>(04).  
<https://doi.org/10.55041/ijcope.v2i4.231>

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## Abstract—

Vehicular Ad Hoc Networks (VANETs) play a vital role in enabling smart transportation systems by facilitating communication between vehicles. However, existing vehicular announcement systems face two major challenges: preserving user privacy and motivating users to share reliable traffic information. In this paper, we propose **CreditCoin**, a privacy-preserving blockchain-based incentive announcement network. The system utilizes an anonymous vehicular announcement aggregation protocol combined with blockchain technology to ensure secure, tamper-resistant, and decentralized communication. Users can broadcast traffic updates anonymously while earning incentives for participation, thereby improving network reliability. A Trace Manager enables conditional privacy by identifying malicious users without compromising honest participants. The proposed system is implemented using Python, Web3, and a simulated VANET environment. Experimental results demonstrate improved efficiency, reduced computation time, and enhanced data reliability compared to traditional approaches. This work contributes toward secure and incentive-driven communication in smart transportation systems.

In this paper, we propose **CreditCoin**, a privacy-preserving blockchain-based incentive announcement network. The system utilizes an anonymous vehicular announcement aggregation protocol combined with blockchain technology to ensure secure, tamper-resistant, and decentralized communication. Users can broadcast traffic updates anonymously while earning incentives for participation, thereby improving network reliability. A Trace Manager enables conditional privacy by identifying malicious users without compromising honest participants.

**Keywords—** VANET; Blockchain; Privacy Preservation; Incentive Mechanism; Smart Vehicles; CreditCoin



## I. INTRODUCTION

The rapid growth of smart cities has increased the need for efficient vehicular communication systems. Vehicular Ad Hoc Networks (VANETs) enable vehicles to exchange traffic information, improving road safety and reducing congestion. However, existing systems suffer from **privacy leakage** and **lack of user motivation**.

Users hesitate to share traffic data due to exposure of sensitive information such as identity and location. Additionally, without incentives, users are less likely to participate in data sharing. Traditional approaches such as group signatures and threshold authentication introduce high computational overhead and fail to address these challenges effectively.

To overcome these issues, this paper proposes **CreditCoin**, a blockchain-based incentive network that ensures privacy, security, and active participation. The main objectives are:

- Preserve user anonymity
- Provide incentives for participation
- Ensure data integrity using blockchain
- Enable traceability of malicious users

## II. LITERATURE REVIEW

Existing research in VANETs focuses on secure communication and privacy preservation. Traditional methods rely on Public Key Infrastructure (PKI) and group signatures, which suffer from scalability issues and high computational cost.

Recent studies introduced blockchain for decentralized trust management. Blockchain improves data integrity and eliminates single points of failure but introduces latency challenges. Incentive-based models have also been explored to encourage user participation.

Haider et al. proposed a blockchain-enabled incentive mechanism to optimize collaborative task allocation in IoV environments. Their approach improves resource sharing and coordination among vehicles by rewarding participants for contributing data and computational resources. The system enhances efficiency and reduces communication

overhead; however, it mainly focuses on task allocation and does not fully address privacy preservation in vehicular announcements [1].

Zhan et al. introduced PIAS, a privacy-preserving incentive announcement system based on blockchain for IoV. The system allows vehicles to send announcements anonymously while using blockchain accounts for secure participation and reward distribution. It successfully addresses both privacy and incentive challenges by ensuring anonymous message sharing and motivating users to respond to traffic requests. However, the system relies on semi-trusted environments and may introduce computational complexity in large-scale networks [2].

Saleem et al. proposed a blockchain-based privacy preservation approach using steganography in drone-enabled VANETs. Their method enhances data security by embedding sensitive information within encrypted communication, ensuring confidentiality and resistance to data tampering. While this approach strengthens privacy and security, it increases computational overhead and may not be suitable for real-time vehicular communication systems [3].

However, current solutions still lack:

- Efficient privacy-preserving mechanisms
- Lightweight computation
- Effective incentive integration

The proposed CreditCoin system addresses these gaps by combining blockchain, incentive mechanisms, and anonymous aggregation protocols.

## III. METHODOLOGY

### A. System Architecture

The system consists of:

- Vehicles (Initiator & Repliers)
- Trusted Authority (TA)
- Blockchain Network
- Trace Manager



## B. Working Process

1. **Network Initialization:** Vehicles are simulated in a VANET environment
2. **Key Generation:** TA generates encryption keys
3. **Announcement Sharing:** Initiator sends encrypted messages
4. **Aggregation Protocol:** Repliers validate and forward messages
5. **Blockchain Storage:** Data stored securely in blockchain
6. **Incentive Distribution:** Participants earn CreditCoins

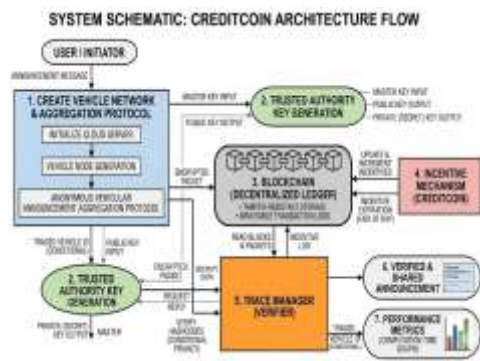


Figure 1: Architecture of CreditCoin System

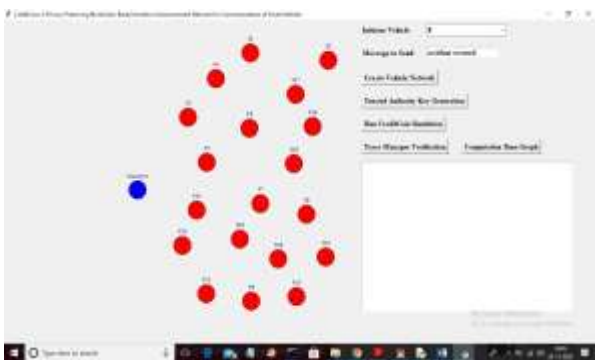


Figure 2: Simulated Vehicular Network

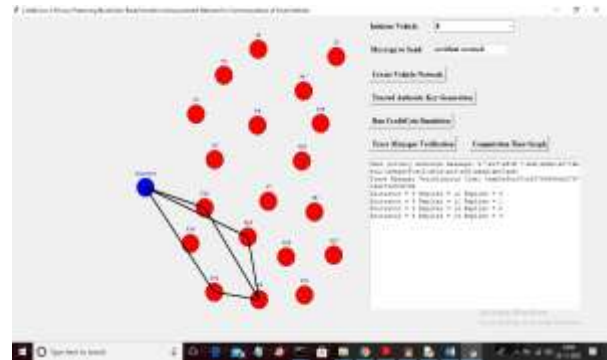


Figure 3: Message Exchange Between Vehicles



Figure 4: Computation Time Analysis

## C. Technologies Used

- Python (Tkinter, Matplotlib)
- Web3 (Blockchain integration)
- SHA-1 (Hashing)
- Local Blockchain (Ethereum-based)

## IV. RESULTS AND DISCUSSION

The system was tested in a simulated environment with multiple vehicles.

### Key Observations:

- Secure message transmission using encryption
- Successful anonymous communication
- Blockchain ensures tamper-proof storage
- Incentive mechanism increases participation



### Performance Analysis:

- Reduced computation time compared to traditional methods
- Faster request, reply, and verification processes
- Improved reliability of announcements

Table I: performance analysis table

Parameter	Existing System	Proposed CreditCoin System
Privacy Protection	Partial (identity exposed)	High (anonymous communication)
Incentive Mechanism	Not Available	Available (CreditCoin rewards)
Data Security	Low (centralized storage)	High (blockchain-based)
Computation Time	High	Low
Scalability	Limited	High

### V. CONCLUSION

This paper presents **CreditCoin**, a privacy-preserving blockchain-based incentive system for vehicular communication. The proposed system successfully addresses key challenges in VANETs, including privacy protection, data reliability, and user motivation.

The integration of blockchain ensures secure and decentralized data storage, while the incentive mechanism encourages active participation. The Trace Manager provides accountability without compromising anonymity.

### Future Work

- Integration with real-world vehicular datasets
- Optimization for large-scale networks
- Implementation with IoT and 5G technologies

### ACKNOWLEDGMENT

The authors express their gratitude to the faculty of CMR Technical Campus for their guidance and support.

### REFERENCES

- [1] Haider, Z. A., Rahman, M. M., Khan, M. A., & Sohail, Q. (2025). Optimizing Collaborative Task Allocation in Internet of Vehicles (IoV) through Blockchain-Enabled Incentive Mechanisms. *ICCK Transactions on Sensing, Communication, and Control*, 2(3), 147-167.
- [2] Zhan, Y., Yang, Y., Cheng, H., Luo, X., Guan, Z., & Deng, R. H. (2024). PIAS: Privacy-Preserving Incentive Announcement System Based on Blockchain for Internet of Vehicles.
- [3] Saleem, Z., Firdous, U., Afzal, M. K., Ali, A., Iqbal, M., Al-Fuqaha, A., & Al-Rubaye, S. (2023). Blockchain-Based Privacy Preservation Using Steganography in Drone-Enabled VANETs. *GLOBECOM 2023 - 2023 IEEE Global Communications Conference*, 6862-6867.